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(54) Disc brake friction pad and retention system

(57) An improved friction pad (8) which may be incorporated in a vehicle disc brake including a rotor (14) having oppositely disposed friction surfaces, a caliper (28) having recesses (30) defined in portions disposed proximate the friction surfaces of the rotor (14). Each friction pad (8) consists of a backing plate (10) and friction material (12) secured to a major portion of the backing plate (10). Each backing plate (10) includes a pair of circumferentially displaced radially extending projections (16) which receive a single-piece clip (18) having a pair of apertures (20) defined by upturned portions (22,24) which register with the projections (16) providing a resilient interfitting structural connection. The single-piece clip (18) includes a central portion (26) which may be elastically deformed radially inwardly to provide a radially directed resilience to the respective assembly. When the friction pads (8) are installed in the caliper recesses (30), the central portions (26) of the single piece clip (18) protrude radially such that a bridge (32) installed and rotated into place across the caliper (28) achieves displacement of the central structural portions (26) providing a retention mechanism imparting a radially inwardly directed resilience.

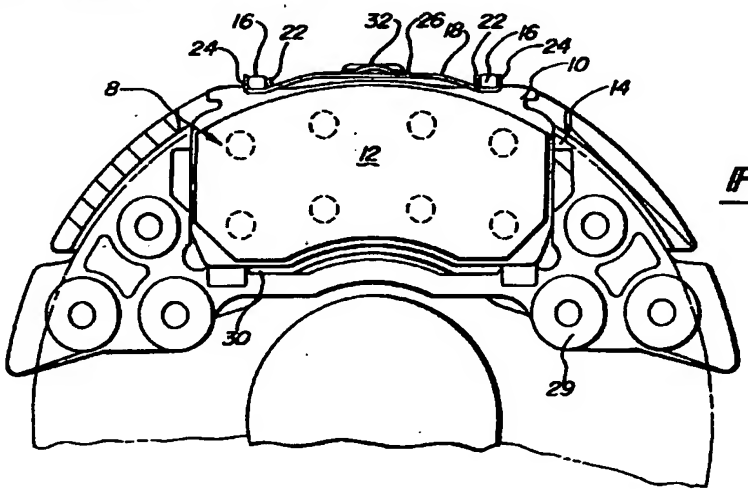

Fig-1

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Description

BACKGROUND OF THE INVENTION

FIELD OF THE INVENTION

The present invention relates to disc brake friction pads and more specifically to an improved means for supporting friction pads in the disc brake assembly.

DESCRIPTION OF THE RELATED ART

The present invention is particularly applicable to a disc brake assembly of the type which includes a rotor mounted for rotation with a vehicle wheel and a caliper straddling the periphery of the rotor. Friction pads are carried by the caliper on opposite sides of the rotor and are movable into contact with oppositely disposed friction surfaces of the rotor by actuating means driven by an air actuator. In a caliper disc brake, each friction pad is located intermediate one leg of the caliper and the adjacent friction surface of the rotor. The actuating mechanism is usually carried by one leg of the caliper and serves to move the friction pad adjacent to that leg axially into contact with the rotor. The reaction force of such contact serving to draw the other leg of the caliper and the corresponding other friction pad into contact with the opposite surface of the rotor.

Although various arrangements are known for supporting friction pads within a disc brake assembly, some require additional elements for preventing inadvertent displacement of the friction pads away from their operative position and others require disassembly of parts or retraction of the actuating mechanism to replace the friction pads which may not be easily accomplished. Others relying on radially converging edges or angularly disposed surfaces to support the friction pad or to transmit torque to the supporting caliper require careful attention to tolerances during manufacture to assure proper fit and location of cooperating parts when the brake is assembled. The present invention avoids these problems by providing a disc brake assembly in which the friction pads are readily accessible for inspection or replacement purposes.

SUMMARY OF THE INVENTION

The present invention provides an improved friction pad which may be incorporated in a vehicle disc brake including a rotor having oppositely disposed friction surfaces, a caliper having recesses defined in portions disposed proximate the friction surfaces of the rotor. Each friction pad consists of a backing plate and friction material secured to a major portion of the backing plate. Each backing plate includes a pair of circumfrentially displaced radially extending projections which receive a single-piece clip having a pair of apertures defined by upturned portions which register with the projections providing a resilient interfitting structural connection. The single-piece clip includes a central portion which may be elastically deformed radially inwardly to provide a radially directed resilience to the respective assembly. When the friction pads are installed in the caliper recesses, the central portions of the single piece clip protrude radially such that a bridge installed and rotated into place across the caliper achieves displacement of the central structural portions providing a retention mechanism imparting a radially inwardly directed resilience.

These and other aspects of the present invention will become more readily apparent by reference to the following detailed description of the embodiments as shown in the drawings.

DESCRIPTION OF THE DRAWINGS

Figure 1 is a cross sectional view of a disc brake assembly including a disc brake fraction pad having the single-piece clip of the present invention installed thereon;
Figure 2 is a plan view of the single-piece clip;
Figure 3 is a cross section of the disc brake assembly taken along lines 3-3 of Figure 1;
Figure 3A is a cross sectional view taken along lines 3A-3A of Figure 3;
Figure 4 is a plan view of a disc brake assembly of the present invention;
Figure 5 is a cross section of the backing plate and single-piece clip prior to installation; and
Figure 6 is a plan view of a disc brake friction pad of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The preferred embodiment of the present invention as illustrated in Figure 1 features a backing plate 10 having a friction material 12 secured thereto. Rotor 14 is shown for reference. Circumfrentially spaced radial projections 16,16 on backing plate 10 provide structure for securance of single-piece clip 18. Single-piece clip 18 is symmetrical about a central point and includes apertures 20,20 located at opposing ends and defined by upturned portions 22,24. A resilient engagement of upturned portions 22,24 against opposing side walls of radial projections 16,16 define a structural securance maintaining contact with backing plate 10. Central portion 26 is elastically deformable over a limited range and thereby capable of providing a resilience in response to such deformation. Disc brake pad 8 may be installed within saddle 29 resting in recess 30 which provides a circumfrential and radial positional definition for brake pad 8. When disc brake pad 8 is installed in recess 30 of saddle 29, bridge 32 as shown in Figure 3 and 4 may be installed thereacross in radiused slots 34,34 defined in opposing sides of caliper 28. The radial dimension of recess 30 provides sufficient radial protrusion of portion 26 of single-piece clip 18 to facilitate partial displacement of portion 26 upon the installation of bridge 32 thereby defining a system resilience that provides an anti-rattle function.

Pins 36,36 may be installed in caliper 28 to retain bridge 32 in place resistant to accelerations which may be encountered in vehicle performance. During installation, bridge 32 may be installed in radiused slots 34,34 by first inserting one end of bridge 32 in the respective radiused slot and rotating bridge 32 thereabouts thus driving bridge 32 into a position in which portion 26 is compressed. To remove brake pads 8,8, upon the necessity of maintenance procedures, the process may be reversed. First pins 36,36 are removed and bridge 32 may be rotated from caliper 28 thereby exposing disc brake pads 8,8 at which point disc brake pads 8,8 may be radially extracted from caliper 28. Circumfrentially extending opposed projections 17,17 offer an engagement structure suitable for receiving a flat bladed screwdriver which may be wedged against caliper 28 to facilitate radial extraction of pads 8,8.

One skilled in the art will readily recognize that certain specific details shown in the foregoing specification and drawings are exemplary in nature and subject to modification without departing from the teachings of the disclosure. Various modifications of the invention discussed in the foregoing description will become to those skilled in the art. All such variations that basically rely on the teachings through which the invention has advanced the art are properly considered within the spirit and scope of the invention.

Claims

1. A backing plate and retention system for a disc brake comprising:
   a backing plate defined by a rectangularly shaped member including circumferentially spaced radially extending projections;
   a retention member having apertures defined by upturned lips formed at opposite ends and positionally registering with said projections;
   said upturned lips providing a resilient force directed against opposing sides of said circumferentially spaced radially extending projections maintaining said member secured to said backing plate.

2. The invention of Claim 1 wherein said member further includes an elastically deformable portion which defines a radially directed resilience in reaction to displacement in such direction.

3. The invention of Claim 1 further comprising;
   a caliper assembly including a rotor having opposing friction surfaces and being rotatable about a first axis,
   said rotor having opposed caliper portions each defining recesses disposed for receiving one each of said disc brake pads,
   said opposed caliper portions having slots formed in an outermost radial portion thereof; and
   a bridge disposed in said slots and maintained in contact with said longitudinally extending retention members.

4. The invention of Claim 3 wherein said bridge is retained in said slots by axially extending cylindrical members disposed in openings defined in opposing ends of said slots.

5. The invention of Claim 3 wherein said slots are radiused and said bridge is rotatably installed in said caliper assembly.

6. In a disc brake assembly including a rotor having oppositely disposed friction surfaces, a caliper having opposing portions defined on each side of said rotor and a pair of disc brake pads supported by said caliper opposite said friction surfaces of said rotor, each said disc brake pad comprising a backing plate having friction materials secured thereto and being defined by a generally rectangular shape including circumferentially spaced radially extending projections disposed at opposing end portions thereof;
   said projections receiving apertures defined by upturned lips formed in a longitudinally extending retention member,
   said caliper including slots defined in an outermost radial portion thereof of said opposing portions which are disposed for receiving opposing ends of a laterally extending member which is maintained in contact with said longitudinally extending retention member.

7. The invention of Claim 6 wherein said retention member includes an elastically deformable portion which is elastically deformed by said laterally extending member.

8. The invention of Claim 6 wherein said retention member is retained in said slots by axially extending cylindrical members disposed in openings defined in opposing ends of said slots.

9. The invention of Claim 6 wherein said slots are radii used and said bridge is rotatably installed in said caliper assembly.

Fig-1

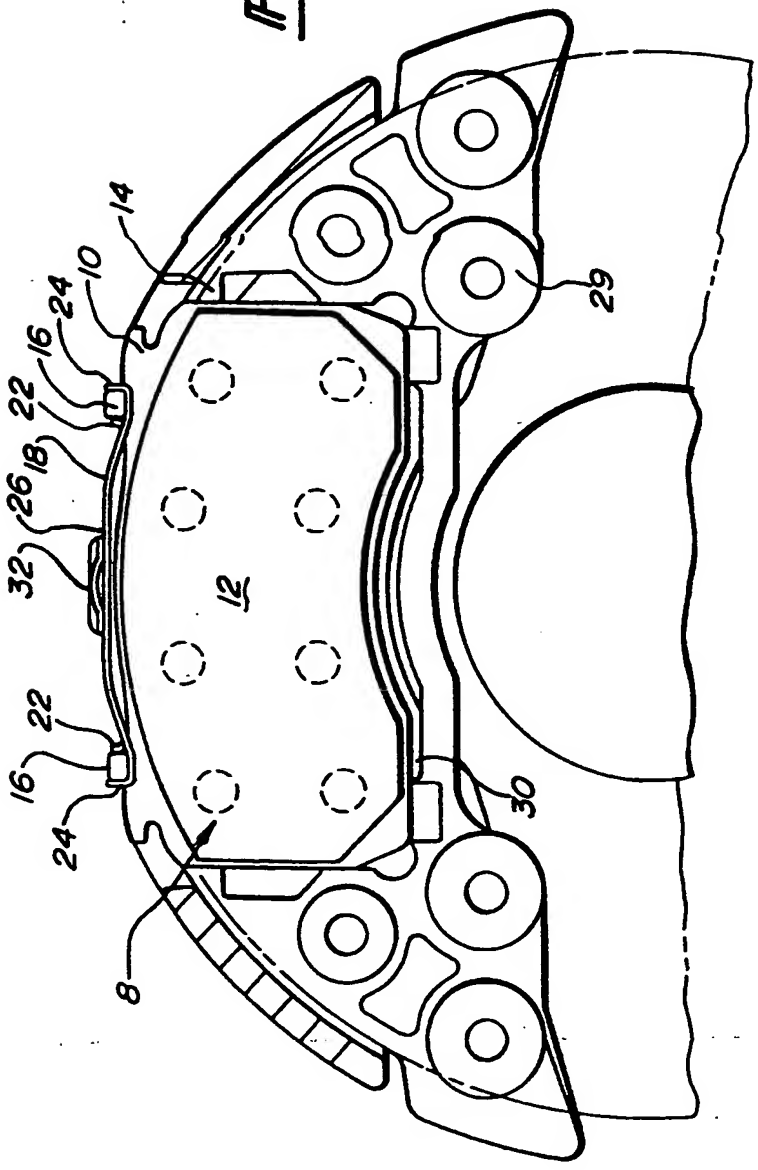


Fig-2

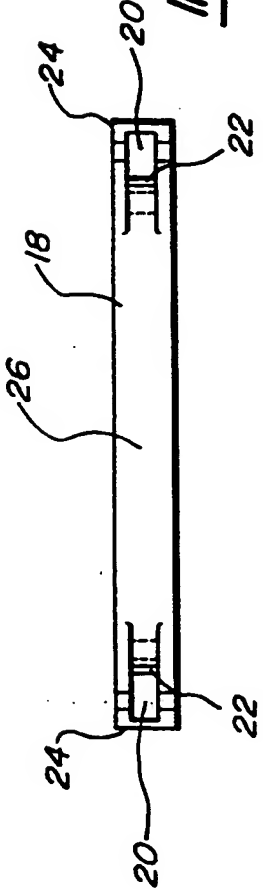


Fig-3

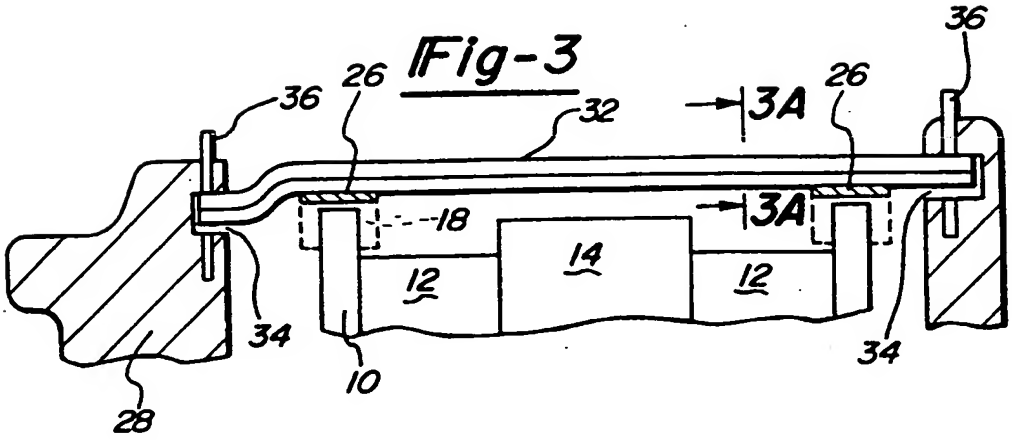
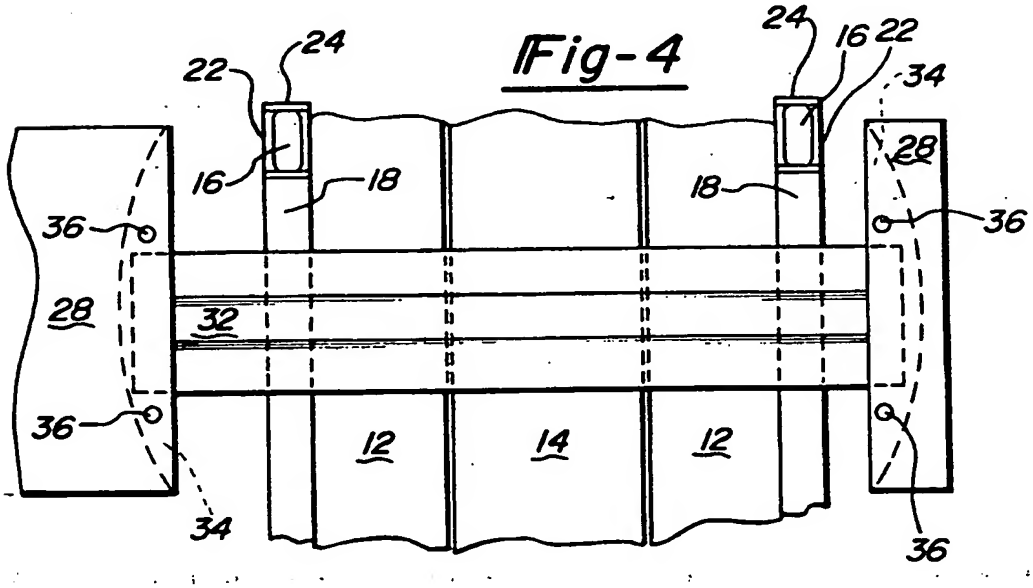


Fig-3A

Fig-4



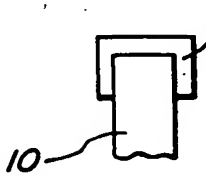


Fig-5

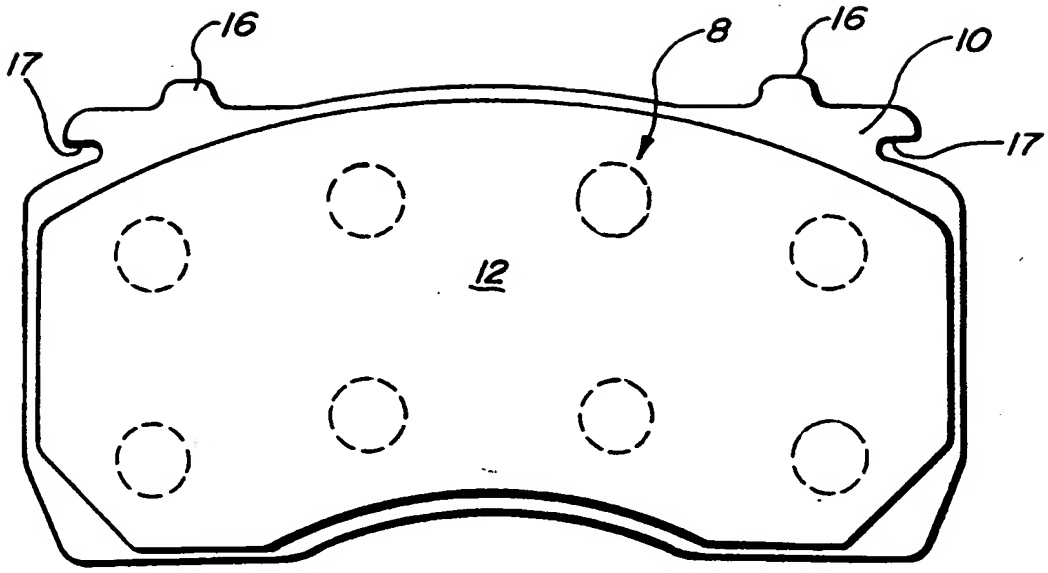


Fig-6

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 94 83 0448

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
A	WO-A-92 00465 (KNORR-BREMSE) * page 4, line 15 - page 7, line 5; figures *	1-3,6,7	F16D65/097
A	EP-A-0 248 385 (LUCAS INDUSTRIES) * column 6, line 55 - column 8, line 22; figures *	1-3,6,7	
A	FR-A-2 461 161 (FERODO) * the whole document *	1,2,6	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

F16D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	21 December 1994	Becker, R

CATEGORY OF CITED DOCUMENTS

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